

Exam Summary (GO Classes 2023 Mock Test 2)

Qs. Attempted: **55**
26 + 29

Correct Attempts: **41**
21 + 20

Incorrect Attempts: **14**
5 + 9

Correct Marks: **61**
21 + 40

Penalty Marks: **3.67**
1 + 2.67

Resultant Marks: **57.33**
20 + 37.33

Total Questions: **65**
30 + 35

Total Marks: **100**
30 + 70

Exam Duration: **180 Minutes**

Time Taken: **180 Minutes**

[EXAM RESPONSE](#) [EXAM STATS](#) [FEEDBACK](#)

Aptitude

Q #1 Multiple Choice Type Award: 1 Penalty: 0.33 Verbal Aptitude

Rajiv Gandhi Khel Ratna Award was conferred _____ Mary Kom, a six-time world champion in boxing, recently in a ceremony _____ the Rashtrapati Bhawan (the President's official residence) in New Delhi.

- A. with, at
- B. on, in
- C. on, at
- D. to, at

[Your Answer: C](#) [Correct Answer: C](#) [Correct](#) [Discuss](#)
Q #2 Multiple Choice Type Award: 1 Penalty: 0.33 Verbal Aptitude

Despite a string of poor performances, the chances of K.L. Rahul's selection in the team are _____

- A. slim
- B. bright
- C. obvious
- D. uncertain

[Your Answer: B](#) [Correct Answer: B](#) [Correct](#) [Discuss](#)
Q #3 Multiple Choice Type Award: 1 Penalty: 0.33 Verbal Aptitude

Select the word that fits the analogy:

Cover : Uncover :: Associate : _____

- A. Unassociate
- B. Inassociate
- C. Misassociate
- D. Dissociate

[Your Answer: A](#) [Correct Answer: D](#) [Incorrect](#) [Discuss](#)
Q #4 Multiple Choice Type Award: 1 Penalty: 0.33 Verbal Aptitude

Hit by floods, the kharif (summer sown) crops in various parts of the country have been affected. Officials believe that the loss in production of the kharif crops can be recovered in the output of the rabi (winter sown) crops so that the country can achieve its food-grain production target of 291 million tons in the crop year 2019 – 20 (July – June). They are hopeful that good rains in July-August will help the soil retain moisture for a longer period, helping winter sown crops such as wheat and pulses during the November-February period.

Which of the following statements can be inferred from the given passage?

- A. Officials declared that the food-grain production target will be met due to good rains.
- B. Officials want the food-grain production target to be met by the November-February period.
- C. Officials feel that the food-grain production target cannot be met due to floods.
- D. Officials hope that the food-grain production target will be met due to a good rabi produce.

Your Answer: D Correct Answer: D [Correct](#) [Discuss](#)

Q #5 Multiple Choice Type Award: 1 Penalty: 0.33 Quantitative Aptitude

The difference between the sum of the first $2n$ natural numbers and the sum of the first n odd natural numbers is _____

- A. $n^2 - n$
- B. $n^2 + n$
- C. $2n^2 - n$
- D. $2n^2 + n$

Your Answer: B Correct Answer: B [Correct](#) [Discuss](#)

Q #6 Multiple Choice Type Award: 2 Penalty: 0.67 Verbal Aptitude

Repo rate is the rate at which Reserve Bank of India (RBI) lends commercial banks, and reverse repo rate is the rate at which (RBI) borrows money from commercial banks.

Which of the following statements can be inferred from the above passage?

- A. Decrease in repo rate will increase cost of borrowing and decrease lending by commercial banks.
- B. Increase in repo rate will decrease cost of borrowing and increase lending by commercial banks.
- C. Increase in repo rate will decrease cost of borrowing and decrease lending by commercial banks.
- D. Decrease in repo rate will decrease cost of borrowing and increase lending by commercial banks.

Your Answer: D Correct Answer: D [Correct](#) [Discuss](#)

Q #7 Multiple Choice Type Award: 2 Penalty: 0.67 Analytical Aptitude

P, Q, R, S, T, U, V, and W are seated around a circular table.

- I. S is seated opposite to W
- II. U is seated at the second place to the right of R
- III. T is seated at the third place to the left of R
- IV. V is a neighbour of S

Which of the following must be true?

- A. P is a neighbour of R
- B. Q is a neighbour of R
- C. P is not seated opposite to Q
- D. R is the left neighbour of S

Your Answer: C Correct Answer: C [Correct](#) [Discuss](#)

Q #8 Multiple Choice Type Award: 2 Penalty: 0.67 Quantitative Aptitude

If two cars A and B move towards each other, where car A starts at 9 a.m. and B at 10 a.m. The speeds of the car A and B are 40 km/hr and 50 km/hr respectively. what distance does car travel when the two cars meet, if the initial distance between A and B is 400 km ?

- A. 100 km
- B. 200 km
- C. 300 km
- D. 400 km

Your Answer: B Correct Answer: B [Correct](#) [Discuss](#)

Q #9 Multiple Choice Type Award: 2 Penalty: 0.67 Quantitative Aptitude

For a matrix $M = [m_{ij}]$; $i, j = 1, 2, 3, 4$, the diagonal elements are all zero and $m_{ij} = -m_{ji}$. The minimum number of elements required to fully specify the matrix is _____

- A. 0
- B. 6
- C. 12
- D. 16

Your Answer: B Correct Answer: B [Correct](#) [Discuss](#)

Q #10 Multiple Choice Type Award: 2 Penalty: 0.67 Quantitative Aptitude

Pipe A and B can fill a tank in 12 minutes and 16 minutes respectively. Both pipe are kept open for x minutes and then B is closed and A fills the rest of tank in 5 minutes. The value of x will be?

- A. 4 minutes
- B. 6 minutes
- C. 5 minutes
- D. 7 minutes

Your Answer: A Correct Answer: A [Correct](#) [Discuss](#)

Technical

Q #1 Multiple Choice Type Award: 1 Penalty: 0.33 Computer Networks

Suppose you are network operator for an ISP, and your ISP has two customer networks (IITB and IISc). For the sake of simplicity, let's assume that IITB only has 3 hosts with the following IP addresses, and IISc only has 2 hosts:

- IITB : 18.0.0.1, 18.0.0.254, 18.255.255.254
- IISc : 128.112.0.1, and 128.112.255.254

You've heard that memory in router line cards is expensive, so you'd like to use as few entries as possible in your line cards. Your colleague at work says he has a solution that only requires two forwarding-table entries.

Give the IP prefix notation that your colleague uses to represent these two networks.

- A. 18.0.0.0/8 and 128.112.0.0/16
- B. 18.0.0.0/24 and 128.112.0.0/8
- C. 18.0.0.0/16 and 128.112.0.0/16
- D. 18.0.0.0/24 and 128.112.0.0/24

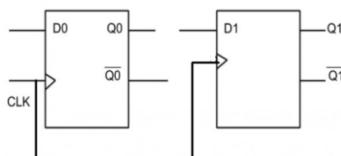
Your Answer: [Correct Answer: A](#) [Not Attempted](#) [Discuss](#)

Q #2 Multiple Choice Type Award: 1 Penalty: 0.33 Digital Logic

Two D Flip flops are connected as a synchronous counter that goes through following sequence

$$00 \rightarrow 01 \rightarrow 11 \rightarrow 10 \rightarrow 00$$

Inputs D_0 and D_1 should be connected as?(Flip flop D_1 provides the MSB)



- A. \bar{Q}_1 and Q_0
- B. \bar{Q}_0 and Q_1
- C. $\bar{Q}_1 Q_0$ and $\bar{Q}_0 Q_1$
- D. $\bar{Q}_0 Q_1$ and $Q_0 Q_1$

Your Answer: [Correct Answer: A](#) [Not Attempted](#) [Discuss](#)

Q #3 Multiple Choice Type Award: 1 Penalty: 0.33 Databases

Let R_1, R_2, \dots, R_n be a decomposition of schema U . Let $u(U)$ be a relation, and let $r_i = \prod_{R_i}(u)$.

Which of the following is true?

- A. $u \subseteq r_1 \bowtie r_2 \bowtie \dots \bowtie r_n$
- B. $u = r_1 \bowtie r_2 \bowtie \dots \bowtie r_n$
- C. $u \supseteq r_1 \bowtie r_2 \bowtie \dots \bowtie r_n$
- D. $u \neq r_1 \bowtie r_2 \bowtie \dots \bowtie r_n$

Your Answer: A Correct Answer: A Correct Discuss

Q #4 Multiple Choice Type Award: 1 Penalty: 0.33 Theory of Computation

Let E be an interval $[a, b]$ of real numbers with $b > a$. So, for any two real numbers a and b where $b > a$, $E = [a, b] = \{x \mid a \leq x \leq b; x \text{ is a real number}\}$.

Which of the following statements is necessarily true?

- A. E is a finite set.
- B. E is a countable set.
- C. E is an uncountable set.
- D. None of the above.

Your Answer: B Correct Answer: C Incorrect Discuss

Q #5 Multiple Choice Type Award: 1 Penalty: 0.33 Theory of Computation

A grammar is said to be “useless” if and only if it produces no terminal strings. If S is the start symbol, which of the following grammars is (are) “useless”?

- I.
 $S \rightarrow A B | A S$
 $A \rightarrow B \mid a$
 $B \rightarrow A \mid b$
- II.
 $S \rightarrow S A \mid A S | S B$
 $A \rightarrow a$
 $B \rightarrow a \mid b$
- III.
 $S \rightarrow \epsilon | A$
 $A \rightarrow B$
 $B \rightarrow C$
 $C \rightarrow a$

- A. None
- B. Only II
- C. Only III
- D. Only II, III

Your Answer: B Correct Answer: B Correct Discuss

Q #6 Multiple Choice Type Award: 1 Penalty: 0.33 Compiler Design

Consider the following grammar.

$$\begin{aligned}X &::= a Y \mid Z \\Y &::= a \mid c \\Z &::= b Y\end{aligned}$$

Which of the following is true for this grammar?

- A. it is LL1 but Not LR1.
- B. It is LR1 but Not LL1.
- C. It is both LL1 and LR1.
- D. It is neither LL1, nor LR1.

Your Answer: C Correct Answer: C Not Attempted Discuss

Q #7 Numerical Type Award: 1 Penalty: 0 Combinatory

A researcher is preparing a questionnaire with 6 questions. The only possible responses to each question are “Yes,” “Maybe,” and “No.” The researcher wants to know how many people answer with any given combination of responses. A programmer is designing a data structure to collate the responses to this questionnaire. The programmer decides to use a base structure containing 6 memory locations, one for each question. Each element will contain a 2 for “Yes,” a 1 for “Maybe,” and a 0 for “No.” One person’s response may look like this:

1	2	2	1	0	1
---	---	---	---	---	---

The programmer then declares an array with one slot for each possible combination of responses. What will be the number of entries in the array?

Your Answer: 729 Correct Answer: 729 Correct Discuss

Q #8 Multiple Select Type Award: 1 Penalty: 0 Compiler Design

Consider the following simple context-free grammars:

Grammar G ₁	Grammar G ₂	Grammar G ₃
S → A	S → A	S → A
A → ε	A → ε	A → ε
A → bbA	A → bAb	A → Abb

The start symbols are S, the non-terminals are S and A, and b is a terminal symbol. You may also treat \$ as a terminal to represent end-of-file. Note that these grammars all generate the same language = L(G₁) = L(G₂) = L(G₃): strings consisting of even numbers of b symbols (including 0 of them).

Which of the following is/are TRUE?

- A. G₁ is LL(1)
- B. G₂ is LL(1)
- C. G₃ is LL(1)
- D. Language generated by these grammar is LL(1)

Your Answer: Correct Answer: A:D Not Attempted Discuss

Q #9 Multiple Choice Type Award: 1 Penalty: 0.33 Mathematical Logic

Consider the following predicates:

- singular (x) : x is a singular matrix
- orthogonal (x) : x is an orthogonal matrix
- symmetric (x) : x is a symmetric matrix

What is the correct translation of the assertion given below into logical notation?

Every singular and orthogonal matrix is not symmetric.

- A. $\forall x[(\text{singular}(x) \vee \text{orthogonal}(x)) \rightarrow \sim \text{symmetric}(x)]$
- B. $\forall x[\sim \text{singular}(x) \wedge \sim \text{orthogonal}(x) \vee \sim \text{symmetric}(x)]$
- C. $\forall x[\sim \text{singular}(x) \vee \sim \text{orthogonal}(x) \vee \sim \text{symmetric}(x)]$
- D. $\forall x[\sim \text{singular}(x) \wedge \sim \text{orthogonal}(x) \wedge \sim \text{symmetric}(x)]$

Your Answer: C Correct Answer: C Correct Discuss

Q #10 Multiple Choice Type Award: 1 Penalty: 0.33 Linear Algebra

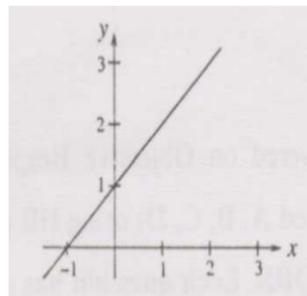
If the given matrices $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$ and $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ satisfy $A^2 = kA - 2I$, the value of coefficient k is _____

- A. 1
- B. 2
- C. 0
- D. 4

Your Answer: A Correct Answer: A Correct Discuss

Q #11 Multiple Choice Type Award: 1 Penalty: 0.33 Calculus

The following plot shows a function y which varies linearly with x. The value of the integral $I = \int_{-1}^2 y dx$ is



- A. 1.0
- B. 2.5

C. 4.0
D. 5.0

Your Answer: B | Correct Answer: B | **Correct** | **Discuss**

Q #12 Numerical Type Award: 1 Penalty: 0 Operating System

Assume a four-CPU machine. Assume that the system provides a user-level threading package and no kernel-level threading. How many CPUs can a single process use, if the process has four user-level threads?

Your Answer: 4 | Correct Answer: 1 | **Incorrect** | **Discuss**

Q #13 Multiple Choice Type Award: 1 Penalty: 0.33 Operating System

Consider the statements below about scheduling algorithms in operating systems.

- If all jobs have identical run lengths, a RR(RoundRobin) scheduler (with a time-slice much shorter than the jobs' run lengths) provides better average turnaround time than FIFO.
- We can practically implement a scheduling algorithm that achieves the optimal average waiting time.
- Round-robin scheduling ensures no starvation.

Which of the following options is correct?

- A. I and II are TRUE but III is False
- B. I is TRUE but II and III are False
- C. I and II are False but III is True
- D. All statements are true

Your Answer: C | Correct Answer: C | **Correct** | **Discuss**

Q #14 Numerical Type Award: 1 Penalty: 0 Operating System

Consider a system which uses a hard disk for storage. The task of managing the hard disk comes under the operating system. It is very important to keep track of occupancy of the hard disk i.e., which block is empty or which block is already occupied. A particular disk unit uses a bit string to record the vacancy and occupancy of its tracks, with 0 denoting vacant and 1 denoting occupied. A 32 bit segment of this string has hexadecimal value F1E0FA36. The percentage of empty track for the corresponding part of the disk, to the nearest percentage is _____ (upto two decimal places).

Your Answer: 43.75 | Correct Answer: 43.75 | **Correct** | **Discuss**

Q #15 Multiple Choice Type Award: 1 Penalty: 0.33 Algorithms

Consider a recursive algorithm for sorting an array of $n \geq 2$ integers that works as follows.

- If there are only 2 elements to be sorted, compare them and swap them if they are out of order.
- Otherwise, do the following steps in order.
 1. Recursively sort the first $n - 1$ elements of the array.
 2. In the resulting array, recursively sort the last $n - 1$ elements.
 3. In the resulting array, recursively sort the first 2 elements of the array.

What is the asymptotic running time complexity of this algorithm measured in terms of the number of comparisons made?

- A. $\Theta(n \log n)$
- B. $\Theta(n^2)$
- C. $\Theta(n^3)$
- D. $\Theta(2^n)$

Your Answer: D | Correct Answer: D | **Correct** | **Discuss**

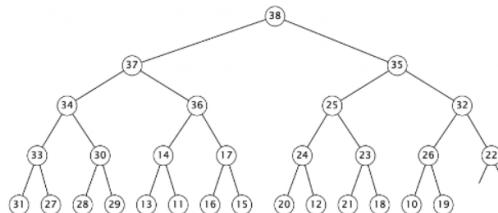
Q #16 Multiple Choice Type Award: 1 Penalty: 0.33 Algorithms

Let $G = (V, E)$ be a connected, undirected graph with edge weights $w : E \rightarrow \mathbb{Z}$. Suppose G has a unique minimum spanning tree. What can you conclude about G ?

- A. G contains no cycles
- B. G contains at most one cycle
- C. All edge weights are different
- D. None of the above

Q #17 | Multiple Select Type | Award: 1 | Penalty: 0 | DS

Consider the following binary heap.



Suppose that the last operation performed in the binary heap above was inserting the key x . What is/are possible values of x ?

- A. 19
- B. 26
- C. 32
- D. 10

Q #18 | Multiple Choice Type | Award: 1 | Penalty: 0.33 | DS

Hooks are usually implemented using arrays. Which of the following statement is correct?

The removal of an element with a known array index from an array of size N requires a time in

- A. $\Theta(\log N)$
- B. $\Theta(N)$
- C. $\Theta(1)$
- D. $\Theta(N^2)$

Q #19 | Multiple Choice Type | Award: 1 | Penalty: 0.33 | DS

If the variables are suitably initialized, and if i remains within appropriate bounds, then the following code implements the stack operations Push and Pop when the stack is represented as an array $V[1 \dots N]$ with an index variable i .

```

Push: begin V[i]:=x; i:=i+1; end
Pop: begin i:=i-1 ; x:=V[i]; end
  
```

Which of the following gives the correct initialization for this stack implementation?

- A. $i:=0$
- B. $i:=1$
- C. $i:=N-1$
- D. $i:=N$

Q #20 | Multiple Choice Type | Award: 1 | Penalty: 0.33 | Algorithms

Let n is always a positive integer.

Consider two statement below -

- S1: If $f(n) > g(n)$ for all n then $g(n)$ is ALWAYS $o(f(n))$, where o is small-oh.
- S2: If $f(n) < g(n)$ for all n then $f(n)$ is ALWAYS $o(g(n))$, where o is small-oh.

Which of the following is the correct option?

- A. S1 is correct but S2 is incorrect
- B. S1 is incorrect but S2 is correct
- C. Both are correct
- D. Both are incorrect

Q #21 Multiple Select Type Award: 1 Penalty: 0 Programming

Consider the following lines of C code

```
int a[10]={9,8,7,6,5,4,3,2,1,0};
int i=(a+4);
int j=&a[3]-&a[1];
int k=(a+(a+6));
5. int m=(&a[5]-a);
```

Which of the following is/are true on the execution of the above lines?

- A. Value of i is 5.
- B. Value of j is 2.
- C. Value of k is 6.
- D. Value of m is 5.

Q #22 Multiple Choice Type Award: 1 Penalty: 0.33 Programming

Let S be the statement:

```
for i:=1 to N do V[i]:=V[i]+1
```

Which of the following perform(s) the same changes to V as S?

- I.

```
i:=0;
while i<=N do
begin i:=i+1 ; V[i]:=V[i]+1 end
```
- II.

```
i:=1;
while i<N do
begin V[i]:=V[i]+1 ; i:=i+1 end
```
- III.

```
i:=0;
while i<N do
begin V[i+1]:=V[i+1]+1 ; i:=i+1 end
```

- A. I only
- B. II only
- C. III only
- D. II and III only

Q #23 Multiple Choice Type Award: 1 Penalty: 0.33 Programming

What will be printed by following C code?

```
int a[7] = {0, 1, 2, 3, 4, 5, 6};
int *p = &a[3];
p += 2;
*p += 2;
5. printf("%d", *p++);
```

- A. 6
- B. 7
- C. 8
- D. 9

Q #24 Multiple Choice Type Award: 1 Penalty: 0.33 CO and Architecture

In microprocessor systems with memory-mapped I/O, which of the following is true?

- A. Only I/O devices with internal memory can be interfaced.
- B. I/O devices can be accessed using IN and OUT instructions.
- C. Each I/O device can be addressed as a memory location.
- D. Arithmetic and logic operations cannot be directly performed with the I/O data.

Your Answer: C Correct Answer: C Correct Discuss

Q #25 Multiple Choice Type Award: 1 Penalty: 0.33 Digital Logic

The unsigned integer 3,505,468,161 can be written in 32-bit binary as 11010000 11110001 00110011 00000001. Putting it into four bytes of memory beginning at address 98370 in big-endian fashion would give which picture?

- A.

98370	98371	98372	98373
11010000	11110001	00110011	00000001
- B.

98370	98371	98372	98373
00000001	111100001	00110011	11010000
- C.

98370	98371	98372	98373
00000001	00110011	111100001	11010000
- D.

98370	98371	98372	98373
00110011	00000001	11010000	111100001

Your Answer: A Correct Answer: A Correct Discuss

Q #26 Multiple Choice Type Award: 2 Penalty: 0.67 Digital Logic

According to the IEEE standard, a 32-bit, single-precision, floating-point number N is defined to be

$$N = (-1)^S \times 1.F \times 2^{E-127}$$

where S is the sign bit, F the fractional mantissa, and E the biased exponent.

A floating-point number is stored as S : E : F, where S, E, and F are stored in 1 bit, 8 bits, and 23 bits, respectively.

What is the decimal value of the floating-point number C1E00000 (hexadecimal notation)?

- A. -12
B. -15
C. -26
D. -28

Your Answer: D Correct Answer: D Correct Discuss

Q #27 Numerical Type Award: 2 Penalty: 0 CO and Architecture

Suppose that in 1000 memory references there are 40 misses in L1 cache and 10 misses in L2 cache. If the miss penalty of L2 is 200 clock cycles, hit time of L1 is 1 clock cycle, and hit time of L2 is 15 clock cycles, the average memory access time will be _____ clock cycles.

Your Answer: Not Attempted Correct Answer: 1.634 Not Attempted Discuss

Q #28 Multiple Choice Type Award: 2 Penalty: 0.67 CO and Architecture

Consider a memory of 32 blocks (labeled 0 through 31) and a cache of 8 blocks (labeled 0 through 7).

In the following sequence of memory block references from the CPU, beginning from an empty cache, on which reference must the cache layout for a direct-mapped and a 4-way set associative cache first differ? (i.e. the referenced memory block causes an existing cached block to be evicted from the cache)

order of reference	1	2	3	4	5	6	7	8
block referenced	0	15	18	5	1	13	15	26

- A. Reference 5
B. Reference 2
C. Reference 4
D. Reference 6

Your Answer: D Correct Answer: D Correct Discuss

Q #29 Multiple Choice Type Award: 2 Penalty: 0.67 DS

Consider a tree with the following properties:

- Each internal node has exactly three children
- The heights of the subtrees rooted at each child differ by at most 1.

Let $T(n)$ represent the minimum number of nodes on a tree with height n . Which of the following is the correct recurrence for $T(n)$?

- A. $T(h) = T(h - 2) + 2 T(h - 1) + 1$
- B. $T(h) = 3 T(h - 1) + 1$
- C. $T(h) = T(h - 1) + 2 T(h - 2) + 1$
- D. $T(h) = 3 T(h - 2) + 1$

Your Answer: C Correct Answer: C Correct Discuss

Q #30 Multiple Choice Type Award: 2 Penalty: 0.67 Computer Networks

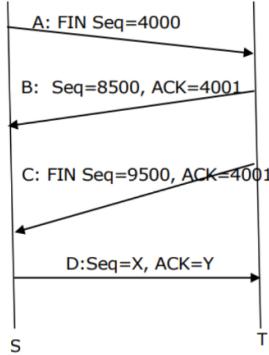
During transmission over a certain binary communication channel, bit errors occur independently with probability p . The probability of AT MOST one bit in error in a block of n bits is given by

- A. p^n
- B. $1 - p^n$
- C. $np(1 - p)^{n-1} + (1 - p)^n$
- D. $1 - (1 - p)^n$

Your Answer: C Correct Answer: C Correct Discuss

Q #31 Multiple Choice Type Award: 2 Penalty: 0.67 Computer Networks

TCP connection termination using three-way handshaking is shown below.



Consider the following statements about this termination:

- I. Between B and C, both-way communication is possible.
- II. Between B and C, T can still send data if T wants but S can't.
- III. X's value is 4000.
- IV. Y's value is 9500.

Which of the above statements is/are true?

- A. II only
- B. I, III, and IV only
- C. I and II only
- D. II, III, and IV only

Your Answer: A Correct Answer: A Correct Discuss

Q #32 Multiple Select Type Award: 2 Penalty: 0 Computer Networks

The below table is a routing table using CIDR. Address bytes are in hexadecimal. The notation "/12" in C4.50.0.0/12 denotes a netmask with 12 leading 1 bits, that is, FF.F0.0.0.

Net/MaskLength	NextHop
C4.5E.2.0/23	A
C4.5E.4.0/22	B
C4.5E.C0.0/19	C
C4.5E.40.0/18	D
C4.4C.0.0/14	E
C0.0.0.0/2	F
80.0.0.0 / 1	G

State to what next hop the following will be delivered.

- A. C4.4B.31.2E will be delivered to F.
 B. C4.5E.05.09 will be delivered to C.
 C. C4.5E.05.09 will be delivered to D.
 D. C4.4D.31.2E will be delivered to E.

Your Answer: Not Attempted

Q #33 Multiple Choice Type Award: 2 Penalty: 0.67 Computer Networks

Assume a link has a round-trip propagation delay of 100 msec. Also, assume an 8 Kbps transmitter and a frame with 3 bit sequence numbers. What is the minimum frame size that can guarantee a 50% channel utilization assuming the selective repeat protocol?

- A. 80 bits
 B. $800/7$ bits
 C. $800/6$ bits
 D. 200 bits

Your Answer: Correct Answer: Incorrect

Q #34 Multiple Choice Type Award: 2 Penalty: 0.67 Digital Logic

Match the Boolean expression with its minimal realization

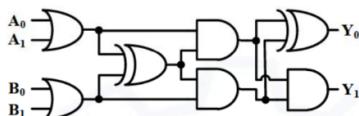
	Boolean expression		Minimal realization
P	$\bar{X}\bar{Y}\bar{Z} + \bar{X}Y\bar{Z} + \bar{X}Y\bar{Z}$	K	$X(Y+Z)$
Q	$XYZ + X\bar{Y}Z + XY\bar{Z}$	L	$\bar{X}(Y+\bar{Z})$
R	$XY + XYZ + X\bar{Y}Z + \bar{X}YZ$	M	Z
S	$\bar{X}\bar{Y}\bar{Z} + \bar{X}YZ + XYZ + XY\bar{Z}$	N	$Y(X+Z)$

- A. P-K, Q-L, R-N, S-M
 B. P-L, Q-K, R-N, S-M
 C. P-L, Q-N, R-M, S-K
 D. P-M, Q-K, R-L, S-N

Your Answer: Correct Answer:

Q #35 Multiple Choice Type Award: 2 Penalty: 0.67 Digital Logic

In the circuit shown below, Y is a 2-bit (Y_1Y_0) output of the combinational logic. What is the maximum value of Y for any given digital inputs, A_1A_0 and B_1B_0 ?

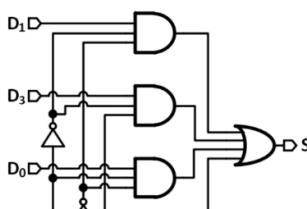


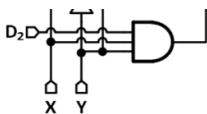
- A. 01
 B. 10
 C. 00
 D. 11

Your Answer: Correct Answer:

Q #36 Multiple Choice Type Award: 2 Penalty: 0.67 Digital Logic

Input bits X and Y are added by using the combinational logic as shown below. S represents the sum of the two bits. For a correct implementation of the sum, the signals D_0, D_1, D_2, D_3 are, respectively.





- A. 1, 0, 0, 1
 B. 0, 1, 0, 1
 C. 1, 0, 1, 1
 D. 0, 1, 1, 0

Your Answer: C Correct Answer: A Incorrect Discuss

Q #37 Multiple Choice Type Award: 2 Penalty: 0.67 Databases

Consider a schema with two relations, $R(A, B)$ and $S(B, C)$, where all values are integers. Make no assumptions about keys. Consider the following three relational algebra expressions:

- a. $\pi_{A, C}(R \bowtie \sigma_{B=1}S)$
 b. $\pi_A(\sigma_{B=1}R) \times \pi_C(\sigma_{B=1}S)$
 c. $\pi_{A, C}(\pi_A R \times \sigma_{B=1}S)$

Which of the three expressions are equivalent (i.e., produce the same answer on all databases)?

- A. Only a, b
 B. Only a, c
 C. Only a, b, c
 D. None

Your Answer: C Correct Answer: A Incorrect Discuss

Q #38 Numerical Type Award: 2 Penalty: 0 Databases

Consider a relation $R(A, B)$ that contains 100 tuples, and a relation $S(B, C)$ that contains 80 tuples; Make no assumptions about keys & assume that the domain of all attributes is integers. Consider the following relational algebra expression:

$$\pi_B R - (\pi_B R - \pi_B S)$$

Let m be the minimum and M be the maximum number of tuples that could be in the result of the above expression, then $m + M$?

Your Answer: 80 Correct Answer: 80 Correct Discuss

Q #39 Multiple Select Type Award: 2 Penalty: 0 Databases

Consider the following concurrent execution of three transactions T_1, T_2, T_3 :

T_1	T_2	T_3
w(X)	r(Y)	r(Z)
w(Y)	r(Z)	w(Z)

- $w(P)$ means Write operation on “P”
- $r(P)$ means Read operation on “P”

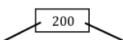
Which of the following is/are False about the given schedule?

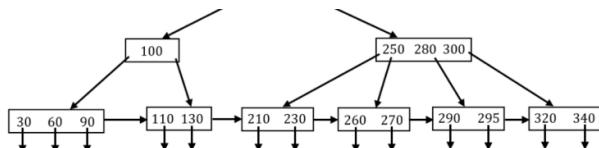
- A. It is conflict serializable.
 B. It is view serializable.
 C. It can be produced by a Two-Phase Lock (2PL) scheduler.
 D. It can be produced by a strict 2PL scheduler.

Your Answer: Correct Answer: D Not Attempted Discuss

Q #40 Multiple Select Type Award: 2 Penalty: 0 Databases

Consider the following B^+ tree.





We want to find out the minimum number of disk IOs required to retrieve the record pointers (not including the disk IOs to read the actual records). We assume we need to follow the sequence pointers of the leaf nodes to traverse the leaf nodes (if necessary). Which of the following is/are correct?

- A. To Find records with the key values in the range 50 to 80 inclusive : 3 disk IO
- B. To Find records with the key values in the range 40 to 90 inclusive : 4 Disk IO
- C. Find records with the key values in the range 40 to 110 inclusive : 4 Disk IO
- D. Find records with the key values in the range 210 to 295 inclusive : 6 Disk IO

Your Answer: A;B Correct Answer: A;C [Incorrect](#) [Discuss](#)

Q #41 [Multiple Choice Type](#) [Award: 2](#) [Penalty: 0.67](#) [Theory of Computation](#)

For any language L , We define middle (L) = $\{x : \exists y, z \in \Sigma^*, (yxz \in L)\}$. Then middle ($\{w \in \{a, b\}^*\}, \#(a) = \#(b)\}$) is ?

- A. Regular.
- B. DCFL but Not regular.
- C. CFL but Not DCFL.
- D. Not CFL.

Your Answer: A Correct Answer: A [Correct](#) [Discuss](#)

Q #42 [Multiple Select Type](#) [Award: 2](#) [Penalty: 0](#) [Theory of Computation](#)

Consider the definition of the Turing machine in which we have a designated accept state q and a reject state r , where q and r are different states. The computation halts (halts immediately) if and only if the Turing machine enters one of these two states. Suppose M is a Turing machine that recognizes the Language L .

Let M' be a Turing machine that is identical to M except the accept and reject states are swapped. Then which of the following is/are viable possibilities (i.e. is possible to be true for some M) for $L(M)$, $L(M')$?

- A. $L(M) = L(M')$
- B. $L(M) \neq L(M')$
- C. $L(M)$ is complement of $L(M')$
- D. $L(M) \cap L(M') = \emptyset$

Your Answer: B;C;D Correct Answer: A;B;C;D [Incorrect](#) [Discuss](#)

Q #43 [Multiple Select Type](#) [Award: 2](#) [Penalty: 0](#) [Theory of Computation](#)

Which of the following languages is Turing recognizable But not Turing decidable?

- A. $L_1 := \{< M > | M \text{ is a TM that halts on all inputs and } L(M) = L' \text{ for some undecidable language } L'\}$.
- B. $L_2 := \{< M > | M \text{ is a TM, and } M \text{ accepts (at least) two strings of different lengths }\}$.
- C. $L_3 := \{< M > | M \text{ is a TM such that both } L(M) \text{ and complement of } L(M) \text{ are finite }\}$.
- D. $L_4 := \{< M > | M \text{ is a TM with 300 states }\}$.

Your Answer: A;C Correct Answer: B [Incorrect](#) [Discuss](#)

Q #44 [Multiple Choice Type](#) [Award: 2](#) [Penalty: 0.67](#) [Compiler Design](#)

Consider the productions $A \rightarrow PQ$ and $A \rightarrow XY$. Each of the five non-terminals A , P , Q , X , and Y has two attributes: s is a synthesized attribute, and i is an inherited attribute. Consider the following rules.

- Rule 1 : $P.i = A.i + 2, Q.i = P.i + A.s$ and $A.s = P.s + Q.s$
- Rule 2 : $X.i = A.i + Y.s$ and $Y.i = X.s + A.i$

Which one of the following is TRUE?

- A. Both Rule 1 and Rule 2 are L-attributed.
- B. Only Rule 1 is L-attributed.
- C. Only Rule 2 is L-attributed.

D. Neither Rule 1 nor Rule 2 is L-attributed.

Your Answer: Correct Answer: D

Q #45 Multiple Choice Type Award: 2 Penalty: 0.67 Combinatory

How many permutations of the 26 letters of the English alphabet do not contain any of the substrings fish, rat, or bird?

- A. $26! - 2 \cdot 24! - 2 \cdot 23! + 21!$
- B. $26! - 2 \cdot 24! - 23! + 21!$
- C. $26! - 24! - 2 \cdot 23! + 2 \cdot 21!$
- D. $26! - 24! - 2 \cdot 23! + 21!$

Your Answer: D

Q #46 Multiple Choice Type Award: 2 Penalty: 0.67 Graph Theory

We are given a graph G along with a matching M and a vertex cover C in it such that $|M| = |C|$. Consider the following statements:

1. M is a maximum matching in G.
2. C is a minimum vertex cover in G.
3. G is a bipartite graph.

Which of the following is TRUE?

- A. Only statement (1) is correct
- B. Only statement (2) is correct
- C. Only statement (3) is correct
- D. Only statements (1) and (2) are correct

Your Answer: D

Q #47 Multiple Choice Type Award: 2 Penalty: 0.67 Set Theory & Algebra

The value of α for which $G = \{\alpha, 1, 3, 9, 19, 27\}$ is a cyclic group under multiplication modulo 56 is

- A. 5
- B. 15
- C. 25
- D. 35

Your Answer: C

Q #48 Numerical Type Award: 2 Penalty: 0 Probability

Due to the current COVID pandemic conditions, assume that positive or negative status of any individual are equally likely. There are 3 members in a family. If one of the members has tested COVID positive, the conditional probability that at least 2 members are COVID positive is _____ (rounded off to three decimal places).

Your Answer:

Q #49 Multiple Select Type Award: 2 Penalty: 0 Operating System

Consider the following two threads, to be run concurrently in a shared memory (all variables are shared between the two threads):

Thread A	Thread B
<pre>for (i=0 ; i<5 ; i++) { x=x+1; }</pre>	<pre>for (j=0 ; j<5 ; j++) { x=x+2; }</pre>

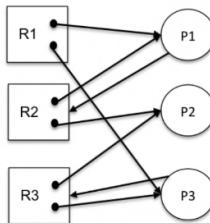
Assume a single-processor system, that load and store are atomic, that x is initialized to 0 before either thread starts, and that x must be loaded into a register before being incremented (and stored back to memory afterwards). The following options consider the final value of x after both threads have completed.

- A. Final value of x will be lesser or equal to 15.
- B. Final value of x can NOT be 1 for any execution order
- C. Final value of x can NOT be 2 for any execution order
- D. Final value of x is greater than equal to 3.

Your Answer: Correct Answer: A:B:C:D Not Attempted Discuss

Q #50 Multiple Select Type Award: 2 Penalty: 0 Operating System

Consider the following resource allocation graph:



Which of the following is/are correct about the above resource allocation graph?

- A. The current System is in a deadlock.
- B. The current System is in deadlock but adding one more instance of R1 will make the system deadlock-free.
- C. The current System is NOT in a deadlock but if we add an additional process P4 that demands an instance of R1, then the system will go to a deadlock.
- D. The current System is NOT in a deadlock but if P2 additionally demands one instance of R1, then the system will go to a deadlock.

Your Answer: C:D Correct Answer: D Incorrect Discuss

Q #51 Multiple Select Type Award: 2 Penalty: 0 Algorithms

You are given an edge-weighted connected undirected graph, using the adjacency list representation, together with the list of edges in its minimum spanning tree (MST).

Now you update the weight of one of the MST edges and recalculate MST.

Which of the following option is/are correct about tightest upper bound on time complexity to recalculate MST?

- A. If we increase edge weight in existing MST then we can calculate new MST in $O(V)$
- B. If we increase edge weight in existing MST then we can calculate new MST in $O(E)$
- C. If we decrease edge weight in existing MST then we can calculate new MST in $O(1)$
- D. If we decrease edge weight in existing MST then we can calculate new MST in $O(B)$

Your Answer: B:C Correct Answer: A:C Incorrect Discuss

Q #52 Multiple Select Type Award: 2 Penalty: 0 Algorithms

Which of the following is/are TRUE?

- A. Dijkstra's algorithm may not terminate if the graph contains negative-weight edges.
- B. Given a graph $G = (V, E)$ with positive edge weights, the Bellman-Ford algorithm and Dijkstra's algorithm can produce different shortest-path trees despite always producing the same shortest-path weights.
- C. The Bellman-Ford algorithm applies to instances of the single-source shortest path problem which do not have a negative-weight directed cycle, but it does not detect the existence of a negative-weight directed cycle if there is one.
- D. On a connected, directed graph with only positive edge weights, Bellman-Ford runs asymptotically as fast as Dijkstra.

Your Answer: B Correct Answer: B Correct Discuss

Q #53 Multiple Choice Type Award: 2 Penalty: 0.67 Algorithms

A hiker faces the 0/1 Knapsack problem. There are 7 items to be packed into the knapsack, each with value v_i and weight w_i as shown in the following table.

i	1	2	3	4	5	6	7
v_i	3	6	8	1	2	5	7
w_i	7	3	5	1	4	2	6

The knapsack, which is initially empty, can hold a maximum weight of 24, so some item(s) must be left behind, and fractions of items cannot be packed. The optimality criterion is to maximize the total value of the items that are placed in the knapsack. The hiker fills the knapsack one item at a time, using a heuristic algorithm that is greedy on value density, where the value density of an item is its value/weight ratio. When this heuristic algorithm is used, what is the total value of the items that are packed, and is this total optimal?

Total Value Optimal/Not Optimal

- A. 29 Optimal
 B. 29 Not Optimal
 C. 30 Optimal
 D. 30 Not Optimal

Your Answer: B | Correct Answer: B | [Correct](#) | [Discuss](#)

Q #54 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | DS

Consider N employee records to be stored in memory for on-line retrieval. Each employee record is uniquely identified by a social security number. Consider the following ways to store the N records.

- I. An array sorted by social security number
- II. A linked list sorted by social security number
- III. A linked list not sorted
- IV. A balanced binary search tree with social security number as key

For the structures I-IV, respectively, the average time for an efficient program to find an employee record, given the social security number as key, is which of the following?

- | | | | |
|----------|-----------|------------|-----------|
| <u>I</u> | <u>II</u> | <u>III</u> | <u>IV</u> |
|----------|-----------|------------|-----------|
- A. $O(\log N)$ $O(N)$ $O(N)$ $O(\log N)$
 B. $O(N)$ $O(\log N)$ $O(N)$ $O(N)$
 C. $O(\log N)$ $O(\log N)$ $O(N)$ $O(1)$
 D. $O(N)$ $O(N)$ $O(N)$ $O(1)$

Your Answer: A | Correct Answer: A | [Correct](#) | [Discuss](#)

Q #55 | Multiple Choice Type | Award: 2 | Penalty: 0.67 | Programming

What will be output if the following function is executed with x equal to 3?

```
void mystery (x)
{
    if (x !=0)
    {
        mystery (x-1);
        mystery (x-1);
        printf ("\%d", x);
    }
}
```

- A. 112211223
 B. 3211211
 C. 1121123
 D. 1121132

Your Answer: C | Correct Answer: C | [Correct](#) | [Discuss](#)

You're doing good, you can target above 80 percentage!